

DISCOVERY IN THE EVERARD RANGES OF A SPECIES OF LEPTODACTYLID FROG NEW TO THE FAUNA OF SOUTH AUSTRALIA

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Summary

Pseudophryne occidentalis (a species of leptodactylid frog formerly known from Western Australia) is reported from the Everard Ranges in the north-west of South Australia. Morphological data are provided and the species is compared with *P. bibroni* and *P. douglasi*. The Everard Ranges population bridges a major disjunction in the geographic distribution of *Pseudophryne*; it is uncertain whether it constitutes a relict in the path of a Pleistocene pluvial migration, or is the result of a more recent migration during arid conditions.

Introduction

In November 1970, Dr. E. Matthews of the South Australian Museum visited the Everard Ranges in the north-west of South Australia, and there obtained six frogs that fell into some cardboard cups which he had sunk in the soil to trap insects. One of the specimens is *Neohatrachus centralis*, a leptodactylid species widely distributed throughout southern and central Australia and previously known to occur in the Everard Ranges. The remaining five are considered to be representatives of the leptodactylid *Pseudophryne occidentalis* Parker, previously known only from localities in the southern interior of Western Australia.

Here I provide data on the morphology of the South Australian population of *P. occidentalis*, with evidence in support of the specific identification, and discuss the significance of the presence of the genus and species in this part of South Australia.

Morphology

The series comprises four adult males with snout to vent lengths of 23.3–26.1 mm, and one gravid female (26.5 mm) which have been allotted the South Australian Museum registration numbers R.11738–11742. The specimens differ from the original description of Parker (1940) only in the colour of the dorsum (dull slate in preservative instead of dull brown), and skin texture (dorsally smooth in four specimens and sparsely and very finely tubercular in the fifth; "regularly beset with small warts above, except on the snout" in the type).

Comparison With Other Species

Two species of *Pseudophryne* were previously known to occur in South Australia:

P. semimarmorata Lucas in the lower south-east, south of Naracoorte (Woodruffe & Tyler 1968); and *P. bibroni* Gunther, extending from the northern limit of *P. semimarmorata* (with which it hybridizes) to the Flinders Ranges.

Pseudophryne semimarmorata, *P. bibroni* and all other *Pseudophryne* species occurring in south-eastern Australia possess oval-shaped, dermal glands on the distal portion of the posterior surface of the femora. In contrast, the three species of *Pseudophryne* occurring in Western Australia (*P. douglasi* Main, *P. guentheri* Boulenger and *P. occidentalis*), and the frogs collected in the Everard Ranges, lack such glands.

Main (1964) characterises *P. guentheri* by its comparatively large size (maximum snout to vent length 30 mm; 26 mm in *P. occidentalis*), single phalanx in inner toe (two in *P. occidentalis*) and possession of supra-scapular folds (absent in *P. occidentalis*).

Because Main (1964) stated that the dorsum of *P. occidentalis* and *P. bibroni* bears flattened confluent warts whereas *P. douglasi* does not, I compared the frogs from the Everard Ranges with a series of *P. douglasi* (Western Australian Museum R. 11531, 11532, 11534) and examined the skin texture of these three species. In specimens from South Australia the dorsum of *P. bibroni* varies from completely smooth to conspicuously warty, with a complete intergradation of textures. A smaller sample of Western Australian *P. occidentalis* includes some individuals with sparsely tubercular skin and others with large confluent warts, whereas the *P. douglasi* have only minute, conical tubercles more sparsely distributed than in Main's (1954) illustration of that species. Skin

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texture is evidently more variable than has been acknowledged previously: *P. douglasi* differs in this character only in the absence of the extremely warty condition.

Pseudophryne douglasi also differs from *P. occidentalis* in its habitat. Main (1971) considered the requirements of the former species to be "some form of cover associated with shallow water beneath which adult frogs can shelter", and noted that the localities at which this species has been collected are within the tropics. This contrasts with *P. occidentalis* which does not enter the tropics but extends into areas of low and unreliable rainfall, where it exists near temporary pools (Main 1965).

Habitat of the South Australian Population

The frogs were collected at Victory Well (132°30'E; 27°3'S) at the southern foot of the Everard Ranges, approximately sixty-five kilometres west of Everard Park Homestead (Fig. 1).

The pool beside which the frogs were trapped was approximately two metres in diameter and 0.3 metres deep. At the time of collection the pool was rapidly drying up, and the ground surrounding it was devoid of vegetation. Data on rainfall in this portion of South Australia assembled by the Commonwealth Bureau of Meteorology are limited, and the only data for Everard Park are for 1948 when 99 mm (3.9 inches) were recorded. At the Ernabella Mission in the Musgrave Ranges 100 km to the north of the collection site, rainfall records for the period 1935-1968 are: annual mean 234 mm (9.22 inches); maximum 424 mm (16.71 inches); minimum 52 mm (2.06 inches).

Discussion

Littlejohn (1967) lists eight anuran species (representing six genera) occurring in south-eastern Australia that form pairs with closely related species in south-western Australia, separated by a distance of at least 1,600 km. *Pseudophryne occidentalis* is included in this list and is regarded as the south-western representative of the south-eastern species *P. bibroni*. The geographic distribution of these two species is shown in Figure 1.

The postulated mechanism for speciation in such genera, viz. the multiple invasion through the intermediate area, requires evidence that on more than one occasion a corridor has existed with a higher rainfall than at present (Main, Lee & Littlejohn 1958; Littlejohn 1961; Lee

1967). The site of the corridor is considered to lie south of the Nullabor Plain, perhaps because such a traverse would minimise the distance travelled by the migrating populations. The migrations are believed to have occurred in the Pleistocene pluvial periods.

The discovery of *P. occidentalis* in the Everard Ranges extends the known geographic range of this species eastwards by 880 km, and is of importance for three reasons. Firstly, it represents the most easterly penetration of any of the south-western species; secondly, it largely bridges the 1,600 km gap between the south-western and south-eastern members of the genus; and thirdly, it lies far to the north of the postulated corridor.

At present it is unknown whether the Everard Range population represents an isolate (i.e. a portion of a formerly more widespread population now restricted by increasing aridity to a small suitable habitat), or the most eastern limit of the now continuous distribution of a species which may have invaded the area during climatic conditions comparable to the present.

Each hypothesis and explanation seems plausible, because *P. occidentalis* is particularly well adapted to desert conditions and is the only species occurring in the desert environment that lays eggs out of water (Main, Littlejohn & Lee 1959; Main 1968). The ecological versatility of this species reported by Main (1959) might have enabled it to penetrate east during conditions inhospitable to the migration of other south-western species.

The initial entry of *Pseudophryne* into Western Australia need not have been via the route utilised by species dependent upon moister conditions, and not necessarily contemporary with the migration of such species.

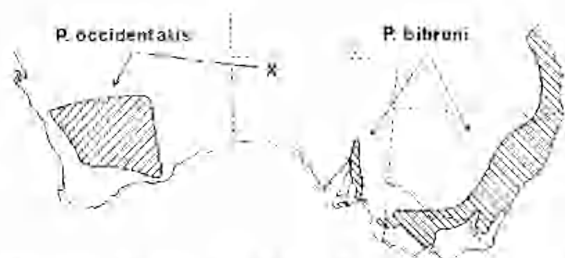


Fig. 1. Distribution of *Pseudophryne occidentalis* and *P. bibroni*. Distribution of *P. occidentalis* provided by Dr. G. Storr; *P. bibroni* distribution derived from specimens in S.A. Museum and published data of Moore (1961) and Littlejohn (1967).

More intensive collecting in the north-west of South Australia would clarify the matter.

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